

REMARKS

This is in response to the Final Rejection of June 16, 2004. Claims 1-23 were rejected. Claims 1, 7, 8, 10, 11, 13, 15, and 20 are amended. Claims 1-23 are pending.

Applicant has amended independent claims 1, 7, 8, 10, 11, and 20 to clarify that the trace data order signal is transmitted along with trace data to indicate which previously executed instruction generated the trace data. Support for this amendment can be found in original claim 20 and in paragraphs [1041] and the discussion in paragraphs [1043]-[1048] regarding tracing out a load with a corresponding load order signal. Applicant has also amended independent claims 1, 7, 8, 10, 11, and 20 to clarify that the trace data order signal specifies how the trace data may be mapped by age with respect to a ranking of the age of outstanding loads. Support for this amendment is found in Table 3 and the discussion in paragraph [1041]. Dependent claims 13 and 15 were amended to be in accordance with the changes to claim 11 from which they depend.

One benefit of Applicant's claimed invention is that it reduces the amount of data that needs to be traced out for a cache miss. In particular, a placeholder does not need to be traced out. Instead, only the relative order of the trace data with regards to the age of previously traced instructions having outstanding trace data needs to be sent with the trace data. Thus, for example, as indicated by Table 3, in some embodiments the trace data order signal specifies that the data is from the oldest instruction, second-oldest instruction, third oldest instruction, fourth oldest instruction, fifth oldest instruction, sixth oldest instruction, seventh oldest instruction, or eighth oldest instruction.

Independent claims 1, 7, 8, 10, 11, and 20 were rejected under 35 U.S.C 103 over Miura (U.S. Pat. No. 5,625,785) in view of Swaine (U.S. Publication Number 2002/0147965). The Examiner stated that Miura teaches that the trace data order is the same as the order of execution of the instructions such that Miura does not teach that the trace data order is different from an instruction order wherein said trace data order signal specifies a transfer order relative to previously executed instructions having outstanding trace data. The Examiner contends that Swaine teaches marking a trace data stream with placeholders for outstanding instructions that discloses this element.

Applicant has amended the claims to distinguish over Swaine by clarifying what is meant by a transfer order relative to previously executed instructions having an outstanding load. In this amendment, Applicant has clarified that the trace data order signal indicates how the trace data may be mapped to a current ranking of the relative age of previously executed instructions having outstanding trace data.

Swaine discloses the use of a placeholder to record the exact location in a data trace stream where a cache miss occurred. Late data is then matched with a placeholder to determine its location in the data trace stream. However, note that two pieces of data need to be transmitted to identify the trace data. First, a placeholder must be traced out, which has a first tag. Second, late data includes a late data tag to permit the late data to be matched to the placeholder.

Applicant's claimed invention does not match a data tag with a placeholder. Some of the differences between Applicant's claimed invention and Swaine can be understood by comparing Figure 3 of Swaine with Table 4 of Applicant's specification. In Swaine, a data placeholder is generated at the location of each cache miss to identify the absolute location where a cache miss occurred. For example, in Figure 3 an instruction trace stream of "LDR[R1] -Miss" results in a "Data Place Holder Tag1" being traced out in the data trace stream. Thus, the data place holder keeps track of the exact, absolute positions of instructions having outstanding data. The late data has a tag that matches the placeholder.

By way of contrast, Table 4 of Applicant's specification shows an implementation in which a PDO_LoadOrder signal indicates the trace data order with respect to a ranking, by age, of previously executed instructions having outstanding loads. Note that for a cache miss, such as which occurs for load A in the top row, a PDO_LoadOrder signal is not sent. Thus, the PDO_LoadOrder signal is not a placeholder. Instead, when there is a cache hit, the PDO_LoadOrder signal is sent with the trace data to indicate a mapping to a ranking of the age of previously executed instructions having outstanding load data. For example, referring to load B in the second row, there is a cache hit. The corresponding PDO_LoadOrder signal that is generated maps the trace data to a ranking, of the relative age of previously executed instructions having outstanding loads. In the

example of load B the PDO_LoadOrder signal indicates that it is for the second oldest outstanding load.

In regards to independent claims 1, 7, 8, 10, 11, and 20, Swaine teaches away from a number of elements. In particular Swaine does not generate a signal that specifies how trace data may be mapped to a current ranking of the relative age of previously executed instructions having outstanding trace data. On the contrary, Swaine uses a tagging technique in which a placeholder with a first tag is placed in the exact spot of the cache miss and the late load data includes a matching tag. The matching utilized by Swaine is a one-to-one mapping between a first tag in a placeholder and a second tag in late load data. Thus, Swaine teaches away from forming a mapping with respect to a ranking by relative age of previously executed instructions.

The Examiner is invited to contact the undersigned if there are any residual issues that can be resolved through a telephone call.

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Cooley Godward LLP
ATTN: Patent Group
Five Palo Alto Square
3000 El Camino Real
Palo Alto, CA 94306-2155
Tel: (650) 843-5000
Fax: (650) 857-0663

Respectfully submitted,
COOLEY GODWARD LLP

By:



Edward A. Van Gieson
Reg. No. 44,386